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PATENT APPLICATION

ATTORNEY DOCKET NO. 10990349-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): STEVEN P. DOWNING

Confirmation No.: 6253

Application No.: 09/496,451

Examiner: PHAM, THIERRY L.

Filing Date: Feb 2, 2000

Group Art Unit: 2624

Title: HIGH ACCURACY SWATH ADVANCE PAPER POSITIONING FOR PRINTERS

Mail Stop Appeal Brief-Patents
Commissioner For Patents
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TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on April 25, 2005.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

() (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

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() The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of \$500.00. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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Number of pages: 37

Typed Name: Colette M. Angle

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Respectfully submitted,

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Date: Jun 27, 2005

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PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Steven P. Downing

Serial No. 10/09/496,451

Filed: 02/02/2000

For: HIGH ACCURACY SWATH
ADVANCE PAPER POSITIONING
FOR PRINTERS

Art Unit: 2624

Examiner: Pham, T.

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APPEAL BRIEF

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For: HIGH ACCURACY SWATH
ADVANCE PAPER POSITIONING
FOR PRINTERS

Art Unit: 2624

Examiner: Pham, T.

JUN 27 2005

APPEAL BRIEF

Commissioner for Patents
Alexandria, VA

Sir:

This appeal is taken from the Office's rejection of Claims 2, 4-25, 27 and 29-32 mailed January 27, 2005, in the subject application.

I. REAL PARTY IN INTEREST.

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. RELATED APPEALS AND INTERFERENCES.

There are no related appeals, interferences or judicial proceedings known to Appellant, the Appellant's legal representative, or assignee.

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III. STATUS OF ALL THE CLAIMS.

Claims 1-30 were filed with this application. During the course of prosecution before the Primary Examiner, new Claims 31 and 32 were added, Claims 1, 3, 26 and 28 were canceled. Claims 2, 2-25, 27 and 29-31 in their present form appear in Appendix 1.

Claims 2, 4-25, 27 and 29-32 are at issue in this appeal.

IV. STATUS OF ALL AMENDMENTS FILED SUBSEQUENT TO FINAL REJECTION.

An amendment was filed March 10, 2005, to correct objections to Claim 10-11, which depended from canceled Claim 1. The amendment changed the dependency of Claims 10-11 to Claim 2. An advisory action mailed April 20, 2005, states that for purposes of appeal, the amendments will be entered. The listing of claims set out in Appendix I reflects entry of the amendments to Claims 10-11.

V. SUMMARY OF THE INVENTION.

The page and line numbers referred to herein are to the specification; reference characters are found in the drawing.

Claim 2 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

- mounting a computer-controlled printing element [24A-24D; FIGS. 1, 8] for movement along a swath axis [30] for swath printing of an image on a print medium;

- moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium [4:26-28];

- activating a media advance mechanism [76; FIG. 8] to provide a nominal advance movement between the printing element and the print medium to position for a fresh swath;

- moving the printing element along the swath axis [4:28-30];

- sensing the position of an edge of a just printed portion of said image which is nominally aligned with the scan axis, wherein said edge

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is a bottom edge of a previously printed swath in relation to a direction of print medium advance through the swath printer past the printing element [4:21-23];

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image to align the top edge of the next swath to be printed in relation to the bottom edge of the previously printed swath, wherein said step of providing relative motion is carried out on the fly as the portion of the image is being printed and the print element is moving in the scan axis [4:28 to 5:11].

Claim 6 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element [24A-24D; FIGS. 1, 8] for movement along a swath axis [30] for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium [4:26-28];

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis [4:21-23];

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion comprising moving the printing element in a direction transverse to the swath axis [6:11-15; 11:1 to 12:12].

Claim 12 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element [24A-24D; FIGS. 1, 8] for movement along a swath axis [30] for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium [4:26-28];

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sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis [4:21-23];

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image [6:11-15; 11:1 to 12:12], said providing relative motion between the print medium and the printing element including

mounting an actuating element [104C, FIG. 12; 11:1-15] between each said printing element and said carriage [20; FIG. 1]; and

actuating each of said actuating elements to move the respective printing elements in a direction transverse to the swath axis [11:9-10].

Claim 13 is drawn to a swath printer, comprising:

a computer-controlled printing structure [24A-24D; FIGS. 1, 8];

a carriage [20; FIG. 1] for holding the printing structure, said carriage mounted for movement along a swath axis [30] at a print area for swath printing of an image on a print medium;

a carriage drive system for driving the carriage along the swath axis [78; FIG. 8];

an optical sensor system [26, 28] mounted to the carriage for sensing the position of a bottom edge of a just printed portion of said image which is nominally aligned with the scan axis;

a media advance system for moving the print media along a media path and past the print area [76; FIG. 8];

a fine positioning system [90; FIG. 8] for providing incremental relative motion between the print medium and the printing element to accurately position the printing element to align the top edge of a to-be-printed image portion in relation to the just printed portion in dependence on the sensed position of the bottom edge of the just printed portion of the image [9:18-23].

Claim 25 is drawn to a method for swath printing, comprising:

printing a first swath of an image on a print medium with an ink-jet printing structure [102, FIG. 9A];

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advancing the print medium to position the medium for printing a second swath [104, FIG. 9A];
determining zones of the second swath which need high accuracy swath alignment [106, FIG. 9A];
begin printing the second swath [108, FIG. 9A];
during said printing of the second swath, for those zones which need high accuracy swath alignment, determine the alignment errors and store in memory appropriate error compensation values [110-114, FIG. 9A];
after completing the printing of said second swath, calculate the next media advance distance based on the stored compensation values [122, FIG. 9B]; and
advancing the media for the next swath to be completed by a distance dependent on said next media advance distance [124, FIG. 9B].

Claim 27 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

providing a print medium;
providing a computer-controlled printing element [24A-24D; FIGS. 1, 8], the printing element mounted for movement along a swath axis [30] to print a first swath on the print medium;
moving the printing element along the swath axis and printing at least a portion of a swath on the print medium, said swath having a leading edge and a trailing edge [FIGS. 2-6];
providing relative motion between the printing element and the print medium to position for a fresh swath [9:18-20];
sensing the position of the trailing edge of the just printed swath [4:21-23];
providing relative motion between the print medium and the printing element to accurately position for the fresh swath in dependence on the sensed position of the trailing edge of the just printed swath to compensate for position errors between a nominal position of the trailing edge and the sensed position of the trailing edge of the just printed swath [4:28 to 5:11]; and

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moving the printing element along the swath axis to print at least a portion of the fresh swath [4:26-28];

wherein said step of sensing the position of the trailing edge and said step of providing relative motion between the print medium and the printing element is performed simultaneously with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath [4:28 to 5:26].

Claim 31 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element [24A-24D; FIGS. 1, 8] for movement along a swath axis [30] for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium [4:26-28];

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis [4:21-23];

providing relative motion between the print medium and the printing element on the fly as the portion of the image is being printed and the print element is moving in the scan axis to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image [4:28 to 5:26].

Claim 32 is drawn to a printing method, comprising:

receiving a print job from a print job source [72; FIG. 8], said print job consisting of text [42, 44, 46; FIGS. 2A-2B] or a graphic image [48; FIG. 2C], or both a text and a graphic image;

mounting a computer-controlled printing element [24A-24D; FIGS. 1, 8] for movement along a swath axis [30] for swath printing of the print job onto a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the print job on the print medium [4:26-28];

activating a media advance mechanism [76, FIG. 8] to provide a nominal advance movement between the printing element and the print medium to position for a fresh swath;

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moving the printing element along the swath axis [4:26-28];
sensing the position of an edge of a just printed portion of said print job swath which is nominally aligned with the scan axis, wherein said edge is a bottom edge of a previously printed swath in relation to a direction of print medium advance through the swath printer past the printing element [4:21-23];

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the print job to align the top edge of the next swath to be printed in relation to the bottom edge of the previously printed swath [9:18-22; FIG. 10].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.

The grounds of rejection to be reviewed on appeal are:

- (i) whether Claims 2, 4-5, 10-11, 13-15, 25, 27 and 31 are anticipated under 35 USC 102(b) by Haselby et al. ("Haselby") (US 4,916,638);
- (ii) whether Claims 6-9 and 12 are unpatentable under 35 USC 103(a) over Haselby in view of Nguyen et al. ("Nguyen") (US 5,297,017);
- (iii) whether Claims 16-22, 24 and 29 are unpatentable under 35 USC 103(a) over Haselby in view of Nguyen;
- (iv) whether Claim 13 is unpatentable under 35 USC 103(a) over Haselby in view of Yoshino (US 5,479,062); and
- (v) whether Claim 30 is unpatentable under 35 USC 103(a) over Haselby in view of Nguyen and Yoshino (US 5,479,062).

VII. ARGUMENT.

For purposes of this appeal, appellant is content to stand on the differences between the claimed invention and the applied references discussed below, because these differences are sufficient to establish that prima facie cases of anticipation and obviousness have not been established, and the applied references do not describe, teach or suggest appellant's invention. Appellant does not concede, however, that other differences do not exist.

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A. The Requirements for Anticipation under Section 102.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim. The elements must be arranged as required by the claim. MPEP 2131.

For reasons discussed below, the rejection under Section 102 should be reversed.

B. A Prima Facie Case of Anticipation has not been established.

Claims 2, 4-5, 10-11, 13-15, 25, 27 and 31 are anticipated under 35 USC 102(b) by Haselby. This rejection should be reversed, since a prima facie case of anticipation has not been established, and the reference does not describe each element of the rejected claims.

Appellant notes that Claim 32 is not discussed in the statement of the statutory grounds for rejection of claims under Section 102, at page 2 of the final rejection. However, at page 6, first sentence, Claim 32 is mentioned along with Claim 31 ("Regarding claims 31-32, please see rejection rationale/basis as described in claim 2 above"). Appellant will consider Claim 32 in the following discussion of the rejection under Section 102(b).

Claim 2:

Claim 2 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

- mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;
- moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;
- sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

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providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion comprising moving the printing element in a direction transverse to the swath axis.

Appellant does not agree with the Examiner's recitation of alleged teachings of Haselby. For example, regarding Claim 2, the Examiner asserts (at page 3, fourth paragraph of the final rejection) that Haselby describes "said step of providing relative motion is carried out on the fly (col. 4, lines 1-48) as the portion of the image is being printed and the print element is moving in the scan axis." Appellant denies that Haselby describes "providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image to align the top edge of the next swath to be printed in relation to the bottom edge of the previously printed swath, wherein said step of providing relative motion is carried out on the fly as the portion of the image is being printed and the print element is moving in the scan axis." See, Haselby, at 5:1-13.

The Examiner further asserts at page 11 of the final rejection that Haselby teaches "wherein said step of providing relative motion is carried out on the fly (col. 4, lines 1-48, and inherently, all swath printers include a mechanism for advancing the print media, col. 5, lines 50-56) as the portion of the image is being printed and the print element is moving in the scan axis." Appellant respectfully disagrees. While swath printers may include a mechanism for advancing the print media, it is not inherent that the print media is to be moved or advance while the print element is moving in the scan axis and the image portion is being printed. Rather, as in Haselby, for example, the print media remains stationary while the swath image portion is being printed and the print element is moved along the scan axis. The allegation of inherency does not address the claim limitation. Nor has the Examiner provided any evidence to support the assertion that this claim limitation is inherent in all swath printers. A prima facie case of anticipation has not been presented.

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Claims 4-5 as amended depend from Claim 2, and are also not anticipated by Haselby.

Claim 13:

Claim 13 is drawn to a swath printer, comprising:

- [A] a computer-controlled printing structure;
- [B] a carriage for holding the printing structure, said carriage mounted for movement along a swath axis at a print area for swath printing of an image on a print medium;
- [C] a carriage drive system for driving the carriage along the swath axis;
- [D] an optical sensor system mounted to the carriage for sensing the position of a bottom edge of a just printed portion of said image which is nominally aligned with the scan axis;
- [E] a media advance system for moving the print media along a media path and past the print area;
- [F] a fine positioning system for providing incremental relative motion between the print medium and the printing element to accurately position the printing element to align the top edge of a to-be-printed image portion in relation to the bottom edge of the just printed portion in dependence on the sensed position of the bottom edge of the just printed portion of the image.

The reference characters have been added for ease of reference.

Haselby does not describe at least element F. The Final Rejection states that "Haselby explicitly discloses a fine positioning system for providing incremental relative motion (media advance system for precisely positioning the media for the next successive swath, abstract and col. 2, lines 22-48 and col. 4, lines 1-20)..." (Pages 11-12 of Final Rejection)

Appellant has disclosed and claimed a printer which includes not just a media advance system, but additionally a fine positioning system which provides relative motion as recited in the claim. The claimed, fine positioning system, element F, is separate and distinct from the media advance system. For this reason, appellant respectfully contends that the printer of Claim 13 is not anticipated by Haselby.

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Claims 14-15:

Claims 14 and 15 depend from Claim 13, and are also not anticipated by Haselby. Claim 15 further recites that the fine positioning system is actuated to provide relative motion to accurately position the printing element in relation to the print medium simultaneously as the printing structure is moved along the swath axis. The limitations of Claim 15 are also not described by Haselby, for reasons similar to those described above regarding Claim 2.

The Examiner refers to Haselby at 4:23-65 to support the assertion that "said step of providing relative motion between the print medium and the printing element is performed simultaneously (sensing and printing simultaneously, col. 4, lines 23-65) with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath." Appellant submits that the cited passage of Haselby not only does not support this contention, but in fact refutes it. Haselby describes that the movement of the print medium occurs during non-printing time periods, while the print head is held stationary (4:46-68).

Claim 25:

Claim 25 is drawn to a method for swath printing, comprising:

[A] printing a first swath of an image on a print medium with an ink-jet printing structure;

[B] advancing the print medium to position the medium for printing a second swath;

[C] determining zones of the second swath which need high accuracy swath alignment;

[D] begin printing the second swath;

[E] during said printing of the second swath, for those zones which need high accuracy swath alignment, determine the alignment errors and store in memory appropriate error compensation values;

[F] after completing the printing of said second swath, calculate the next media advance distance based on the stored compensation values; and

[G] advancing the media for the next swath to be completed by a distance dependent on said next media advance distance.

The reference characters have been added for ease of reference.

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Haselby does not describe at least elements C, E, F and G of Claim 25. Appellant thus respectfully disagrees with the Examiner's allegations of the teachings of Haselby, including the allegations at pages 4-5 and 11-12 of the office action. The citations to particular column and line numbers of Haselby do not support the allegations. For example, there is no determination of zones of the second swath which need high accuracy swath alignment, in the Haselby reference. Instead, Haselby looks to the marginal lines printed for each swath, and makes positioning adjustments prior to printing a next swath.

Nor does Haselby perform the functions of E, F, and G, i.e. "during said printing of the second swath, for those zones which need high accuracy swath alignment, determine the alignment errors and store in memory appropriate error compensation values," "after completing the printing of said second swath, calculate the next media advance distance based on the stored compensation values" and "advancing the media for the next swath to be completed by a distance dependent on said next media advance distance." See, Haselby at 4:30 to 5:12. Rather, Haselby after printing a swath advances the media a distance nominally short of an N nozzle advance, then advances until the sensor output is the same as a stored reference value (indicated that the sensor is over the N nozzle marginal line (FIG. 4), and then either prints at this media position without using nozzle 1, or advances by one nozzle pitch advance open loop with respect to the sensor.

A further exemplary distinction is that the Final Rejection asserts that the Haselby sensor for sensing location of swaths corresponds to element C, with citations to Haselby at 2:22-47 and 8:60-67. It is not understood how the asserted teachings of Haselby correspond to element C of Claim 25. The line sensor of Haselby detects a marginal line, but does not determine zones of the second swath which need high accuracy swath alignment.

For these reasons, appellant respectfully submits that a prima facie case of anticipation of Claim 25 has not been established.

Claim 27:

This claim is drawn to a method for high accuracy media positioning in a swath printer, comprising:

providing a print medium;

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providing a computer-controlled printing element, the printing element mounted for movement along a swath axis to print a first swath on the print medium;

moving the printing element along the swath axis and printing at least a portion of a swath on the print medium, said swath having a leading edge and a trailing edge;

providing relative motion between the printing element and the print medium to position for a fresh swath;

sensing the position of the trailing edge of the just printed swath;

providing relative motion between the print medium and the printing element to accurately position for the fresh swath in dependence on the sensed position of the trailing edge of the just printed swath to compensate for position errors between a nominal position of the trailing edge and the sensed position of the trailing edge of the just printed swath; and

moving the printing element along the swath axis to print at least a portion of the fresh swath;

wherein said step of sensing the position of the trailing edge and said step of providing relative motion between the print medium and the printing element is performed simultaneously with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath.

This claim recites that said step of sensing the position of the trailing edge and said step of providing relative motion between the print medium and the printing element is performed simultaneously with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath. Haselby does not disclose this limitation, as described above regarding Claim 2.

Claim 31:

Claim 31 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

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moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element on the fly as the portion of the image is being printed and the print element is moving in the scan axis to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image.

Haselby does not describe each element of Claim 31, including for example "providing relative motion between the print medium and the printing element on the fly as the portion of the image is being printed and the print element is moving in the scan axis to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image," as described above regarding Claim 2.

Claim 32

Claim 32 is drawn to a printing method, comprising:

[A] receiving a print job from a print job source, said print job consisting of text or a graphic image, or both a text and a graphic image;

[B] mounting a computer-controlled printing element for movement along a swath axis for swath printing of the print job onto a print medium;

[C] moving the printing element along the swath axis and printing at least a portion of a swath of the print job on the print medium;

[D] activating a media advance mechanism to provide a nominal advance movement between the printing element and the print medium to position for a fresh swath;

[E] moving the printing element along the swath axis;

[F] sensing the position of an edge of a just printed portion of said print job swath which is nominally aligned with the scan axis, wherein said edge is a bottom edge of a previously printed swath in relation to a direction of print medium advance through the swath printer past the printing element;

[G] providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the print job to align the top

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edge of the next swath to be printed in relation to the bottom edge of the previously printed swath.

Haselby does not describe at least the arrangement of steps D, E, F and G. Haselby does not move the printing element along the swath axis, sensing the position of an edge of a just printed portion of the print job swath, and providing relative motion between the print medium and printing element as recited in D, E, F and G. The repositioning of the print media by Haselby occurs while the printing element is not moving along the swath axis, see, e.g., paragraphs 4.1 to 4.4.2, columns 4-5 of Haselby.

Anticipation under Section 102 requires that the elements must be arranged as required by the claim, MPEP 2131. Because Haselby does not describe elements as arranged in Claim 32, the reference does not describe the same method as recited in Claim 32.

For these reasons, appellant contends that a prima facie case of anticipation has not been established, and that Haselby does not describe each element of Claims 2, 4-5, 10-11, 13-15, 25, 27, 31 and 32. The rejection under Section 102 should be reversed.

C. The Requirements of 35 USC §103.

35 USC §103 requires that the invention as a whole must be considered in obviousness determinations. The invention as a whole embraces the structure, its properties and the problem it solves. In re Wright, 6 USPQ2d 1959, 1961 (Fed.Cir. 1988).

In order to provide a basis for obviousness, the applied references must be related to the subject matter of the invention in issue and must suggest (expressly or by implication) the combination of the invention in issue. In re Sernaker, 702 F.2d 989 (Fed.Cir. 1983).

Further, the combined teachings of the prior art references should suggest the advantage of combining the teachings. In re Sernaker, supra, at 995-996.

In determining the combined teachings of the applied references, the subject matter of the claimed invention must not be utilized to provide hindsight

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reconstruction of the applied references. As stated by the Court of Customs and Patent Appeals In re Shuman, 361 F.2d 1008 (CCPA 1966):

It is impermissible to first ascertain factually what appellant did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct appellants' invention from such prior art. 361 F.2d at 1012.

The Examiner bears the burden of establishing a prima facie case of obviousness based on the prior art. "... This burden can be satisfied only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.' The patent applicant may then attack the Examiner's prima facie determination as improperly made out, or the applicant may present objective evidence tending to support a conclusion of nonobviousness." In re Fritch, 23 USPQ 1780, 1783 (Fed.Cir. 1992).

Appellant submits that the Primary Examiner has not established prima facie that the claimed invention would have been obvious in view of the applied references, and that the references do not teach or suggest the claimed invention.

D. A Prima Facie Case of Obviousness Has Not Been Established.

Claims 6-9 and 12 have been rejected as being unpatentable over Haselby In view of Nguyen et al. ("Nguyen"), US 5,297,017. This rejection is respectfully traversed on the grounds that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest the claimed invention.

Claim 6:

Claim 6 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

- mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;
- moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

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sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion comprising moving the printing element in a direction transverse to the swath axis.

The Examiner's allegations regarding Haselby have been addressed above regarding the rejection under Section 102.

The Examiner cites Nguyen as allegedly in the same field of endeavor for swath printers, and alleges that the reference "teaches a method for moving the printing element in a direction transverse to the swath axis (moving ink jet nozzles perpendicular to the swath axis (vertical alignment of ink jet nozzles of the printhead), fig. 3, abstract, col. 1, lines 60-67 to col. 2, lines 1-6 and col. 21, lines 40-50). The Examiner further alleges that it would have been obvious to modify Haselby "as per teachings of Nguyen because of a following reason (1) to provide a better and an accurate position of the printhead for printing the next swath by moving the printing element transverse to the swath axis, (2) to avoid banding of the resulting or printed product (Haselby, col. 8, lines 10-30). Appellant respectfully disagrees with the allegations of the teachings of Nguyen, and asserts that there is no motivation to combine the references in the manner suggested by the Examiner.

Nguyen describes a "print cartridge alignment in paper axis" apparatus and technique. The abstract states:

"... Alignment of the operation of the printheads along the media scan axis is performed by determining with the optical sensor the relative positions of horizontal test line segments printed by selected nozzles of the printhead cartridges. The relative position information is utilized to calculate a vertical alignment correction which is implemented by enabling selected ink jet nozzles of the printheads and adjusting the position of one printhead cartridge relative to the other such that the nozzles of the ink jet printheads are properly spaced along the media scan axis."

The alignment of the printheads is achieved during a calibration mode by printing test lines, as described at 14:59 to 19:68. There is no teaching or suggestion that the printheads be moved in a direction transverse to the scan

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axis during normal printing operations, e.g. for providing relative motion to position the printhead in relation to a just printed edge of a swath. Moreover, the allegation that it would have been obvious to modify Haselby "as per the teachings of Nguyen" is the product of hindsight reconstruction.

The Examiner asserts at page 14 of the final rejection that "Nguyen (U.S. 5297017) explicitly teaches a swath printer's printhead can be moved transverse to the scan axis during normal operations (vertical alignment, fig. 17a). Note: **Nguyen's system includes both vertical and horizontal alignment of printhead (that is, moving in both direction, vertical and horizontal).**" Appellant respectfully disagrees. Nguyen at fig. 17a describes a calibration process, not a process carried out during normal printing operations. There is no teaching or suggestion that the process described in fig. 17a should somehow be used during normal printing operations to provide accurate positioning. Nor would the cam apparatus and positioning process of fig. 17a lend itself to use in the manner suggested by the Examiner.

Claims 7-9:

Similar considerations apply to dependent Claims 7-9 as described regarding Claim 6. Moreover, Nguyen does not disclose the additional limitations, e.g. of Claim 8 (positioning an actuating element between the slider rod and the carriage; and driving the actuating element to move the carriage and the printing element to obtain the accurate positioning) and Claim 9 (positioning an actuating element between the slider rod and a corresponding slider supporting structure; and driving the actuating element to move the slider rod and with it the carriage and the printing element to obtain the accurate positioning). Appellant respectfully disagree with the Examiner's contentions as to the teachings of Nguyen regarding these claims, wherein the Examiner apparently contends that the actuator 111 reads on the features of Claims 8 and 9.

Claim 12:

Claim 12 is drawn to a method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

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moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion between the print medium and the printing element including

mounting an actuating element between each said printing element and said carriage; and

actuating each of said actuating elements to move the respective printing elements in a direction transverse to the swath axis.

Neither reference, alone or in combination, teaches or suggests the method of Claim 12, for reasons similar to those discussed above regarding Claim 6. Moreover, neither reference teaches or suggests "mounting an actuating element between each said printing element and said carriage; and actuating each of said actuating elements to move the respective printing elements in a direction transverse to the swath axis" as recited in Claim 12. FIG. 5 of Nguyen shows a system for moving one printhead, i.e. printhead C1, in relation to fixed printhead C2.

Claims 16-22, 24 and 29 stand rejected as being unpatentable over Haselby in view of Nguyen.

Claim 16:

Claim 16 depends from Claim 13, and further recites that "said fine positioning system provides relative motion between the print medium and the printing element by moving the printing element in a direction transverse to the swath axis." Haselby does not teach or suggest moving the printing element in a direction transverse to the swath axis. Nguyen teaches an alignment technique used to print and sense test lines, but does not teach or suggest using moving the printing element in a direction transverse to the swath axis to provide "incremental relative motion between the print medium and the printing

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element to accurately position the printing element to align the top edge of a to-be-printed image portion in relation to the just printed portion. In dependence on the sensed position of the bottom edge of the just printed portion of the image" as in Claim 13.

The Examiner asserts that it would have been obvious to modify Haselby as per teachings of Nguyen because of a following reason: "(1) to provide a better and an accurate position of the printhead for printing the next swath by moving the printing element transverse to the swath axis; (2) to avoid banding of the resulting or printed product (Haselby, col. 8, lines 10-30). Appellant respectfully disagrees. The generalized allegations of reasons to combine the references does not meet the Examiner's burden of providing a convincing line of reasoning or evidence supporting the modification. The rejection is the product of prohibited hindsight reconstruction.

There is no teaching or suggestion from the applied references to make the modification suggested by the references. Nguyen is directed to print cartridge alignment techniques for aligning the position and operation of one printhead relative to a second printhead, and thus is not directed to the same problem addressed by Haselby's system.

Claims 17-20:

Claims 17-20 depend from Claim 16. The rejection of these claims should be reversed for the reasons described above regarding Claim 16, and because these dependent claims add further distinguishing features not described by either applied reference.

Claim 17 recites that the fine positioning system includes an actuating element between the printing structure and the carriage to move the printing structure to obtain the accurate positioning. The Examiner alleges that Nguyen teaches the printer of Claim 16, with "the fine positioning system including an actuating element (cam actuator for adjusting vertical and horizontal alignment, fig. 5, col. 5, lines 1-67) between the printing structure and the carriage (cam actuating structure 111, fig. 5) to move the printing structure to obtain the accurate positioning." Appellant respectfully disagrees. Here again, there is no teaching or suggestion that the cam actuator be employed during normal printing operations to provide a fine positioning system as recited in Claims 13 and 18. The allegation that it would have been obvious to modify Haselby to arrive at

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the printer of Claim 18 is the product of attempted prohibited hindsight reconstruction.

Similar considerations apply to Claims 19 and 20. Claim 19 depends from Claim 16, and recites that "said carriage is mounted for sliding movement along a slider rod, and said fine positioning system includes an actuating element disposed between the slider rod and the carriage to move the carriage and the printing structure to obtain the accurate positioning." The Examiner now alleges that the actuator 111 is disposed between the slider rod and the carriage, in contrast to the allegation regarding Claim 17 that the actuator 111 was disposed between the printing structure and the carriage.

Claims 21-22:

Claims 21-22 are also not taught or suggested by the applied references, for reasons as given above regarding Claim 13 and Claim 12. Moreover, neither Haselby nor Nguyen teach or suggest the features of Claim 22 ("wherein the printing element includes a plurality of ink-jet pens mounted in a carriage, and wherein said fine positioning system includes an actuating element mounted between each said pen and said carriage for moving the respective printing elements in a direction transverse to the swath axis"). Nguyen discloses an actuator system for adjusting the position of print cartridge C1 relative to C2, not for adjusting C1 and C2.

Claim 24:

Claim 24 depends from Claim 13, and further recites that "the sensor system includes a first sensor mounted on a first side of the carriage and a second sensor mounted on a side of the carriage opposite the first side along the swath axis, the sensor system adapted for bidirectional sensing operation." The printer of Claim 24 is not taught or suggested by the applied references. The Examiner alleges that Nguyen discloses a first sensor and a second sensor, and alleges that it would have been obvious to mount the first sensor on a first side and a second sensor on the second side (opposite to the first) to precisely adjust the printhead to an appropriate position for printing the next swath. Appellant respectfully disagree. Nguyen discloses optical sensor 65, not a first sensor and a second sensor as recited in Claim 24. The allegations that it would

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have been obvious to mount a first sensor and a second sensor is without foundation, and the product of improper hindsight reconstruction.

Claim 29:

The rejection of Claim 29 should be withdrawn for reasons similar to those discussed above regarding Claim 16.

Claim 23:

Claim 23 stands rejected as being unpatentable over Haselby in view of Yoshino. This rejection is respectfully traversed on the grounds that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest the claimed invention.

Claim 23 depends from Claim 13, and further recites that the fine positioning system includes a piezoelectric actuator for providing the incremental relative motion. The Examiner alleges that Yoshino teaches a printer using a piezo actuator, and that it would have been obvious to modify Haselby "as per teachings of Yoshino because of a following reason: (1) to provide higher speed actuating element for printer (Yoshino, col. 1, lines 10-12)." Appellant respectfully disagrees. Yoshino describes a driving circuit which mechanically drives a pin of impact-type dot-matrix printers (1:6-8). Haselby does not describe a fine positioning system as recited in Claim 13. There is no teaching or suggestion to use a piezoelectric actuator for providing incremental relative motion as recited in Claim 23. The allegation of obviousness is the product of improper hindsight reconstruction. The rejection should be withdrawn.

Claim 30:

Claim 30 stands rejected as being unpatentable over Haselby in view of Nguyen and Yoshino. Similar considerations apply to this rejection as just discussed regarding the rejection of Claim 23.

Appellant respectfully submits that the rejections under Section 103 should be withdrawn.

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VII. SUMMARY

The rejections under 35 USC § 102 and 103 must be reversed. Prima facie case of anticipation and obviousness have not been made, and the cited references do not teach or suggest the claimed invention.

Respectfully submitted,



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APPENDIX I

Claim 1 (Canceled)

2. (Previously Presented) A method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

activating a media advance mechanism to provide a nominal advance movement between the printing element and the print medium to position for a fresh swath;

moving the printing element along the swath axis;

sensing the position of an edge of a just printed portion of said image which is nominally aligned with the scan axis, wherein said edge is a bottom edge of a previously printed swath in relation to a direction of print medium advance through the swath printer past the printing element;

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image to align the top edge of the next swath to be printed in relation to the bottom edge of the previously printed swath, wherein said step of providing relative motion is carried out on the fly as the portion of the image is being printed and the print element is moving in the scan axis.

Claim 3. (Canceled)

4. (Previously Presented) The method of Claim 2 wherein said step of providing relative motion between the print medium and the printing element is performed simultaneously with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath.

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5. (Previously Presented) The method of Claim 2 wherein:
said providing relative motion between the print medium and the printing element is performed after printing a swath and before said moving the printing element along the swath axis to print at least a portion of a next swath.

6. (Previously presented) A method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion comprising moving the printing element in a direction transverse to the swath axis.

7. (Original) The method of Claim 6 wherein said step of mounting said printing element includes mounting the printing element in a movable carriage, and said moving the printing element in a direction transverse to the swath axis includes:

positioning an actuating element between the printing element and the carriage; and

driving the actuating element to move the printing element to obtain the accurate positioning.

8. (Original) The method of Claim 6 wherein said step of mounting the printing element includes mounting the printing element in a carriage for sliding movement along a slider rod, and said moving the printing element in a direction transverse to the swath axis includes:

positioning an actuating element between the slider rod and the carriage;
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driving the actuating element to move the carriage and the printing element to obtain the accurate positioning.

9. (Original) The method of Claim 6 wherein said step of mounting the printing element includes mounting the printing element in a carriage for sliding movement along a slider rod, and said moving the printing element in a direction transverse to the swath axis includes:

positioning an actuating element between the slider rod and a corresponding slider supporting structure; and

driving the actuating element to move the slider rod and with it the carriage and the printing element to obtain the accurate positioning.

10. (Previously Presented) The method of Claim 2 wherein the step of providing relative motion between the print medium and the printing element includes incrementally moving the print medium in a direction transverse to the scan axis.

11. (Previously Presented) The method of Claim 2 wherein the printing element includes an ink-jet pen.

12. (Previously presented) A method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image, said providing relative motion between the print medium and the printing element including

mounting an actuating element between each said printing element and said carriage; and

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actuating each of said actuating elements to move the respective printing elements in a direction transverse to the swath axis.

13. (Previously presented) A swath printer, comprising:
- a computer-controlled printing structure;
 - a carriage for holding the printing structure, said carriage mounted for movement along a swath axis at a print area for swath printing of an image on a print medium;
 - a carriage drive system for driving the carriage along the swath axis;
 - an optical sensor system mounted to the carriage for sensing the position of a bottom edge of a just printed portion of said image which is nominally aligned with the scan axis;
 - a media advance system for moving the print media along a media path and past the print area;
 - a fine positioning system for providing incremental relative motion between the print medium and the printing element to accurately position the printing element to align the top edge of a to-be-printed image portion in relation to the just printed portion in dependence on the sensed position of the bottom edge of the just printed portion of the image.

14. (Original) The printer of Claim 13, wherein said fine positioning system is actuated to provide relative motion to accurately position the printing element in relation to the print medium between printing successive swaths.

15. (Original) The printer of Claim 13, wherein said fine positioning system is actuated to provide relative motion to accurately position the printing element in relation to the print medium simultaneously as the printing structure is moved along the swath axis.

16. (Original) The printer of Claim 13 wherein said fine positioning system provides relative motion between the print medium and the printing element by moving the printing element in a direction transverse to the swath axis.

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17. (Original) The printer of Claim 16, wherein said fine positioning system includes an actuating element between the printing structure and the carriage to move the printing structure to obtain the accurate positioning.

18. (Original) The printer of Claim 16, wherein said carriage is mounted for sliding movement along a slider rod mounted to a slider rod support structure, and said fine positioning system includes an actuating element disposed between the slider rod and the slider rod support structure to move the slider rod and with it the carriage and the printing element.

19. (Original) The printer of Claim 16, wherein said carriage is mounted for sliding movement along a slider rod, and said fine positioning system includes an actuating element disposed between the slider rod and the carriage to move the carriage and the printing structure to obtain the accurate positioning.

20. (Original) The printer of Claim 16 wherein the fine positioning system incrementally moves the print medium in a direction transverse to the scan axis.

21. (Original) The printer of Claim 13 wherein the printing structure includes an ink-jet pen.

22. (Original) The printer of Claim 13 wherein the printing element includes a plurality of ink-jet pens mounted in a carriage, and wherein said fine positioning system includes an actuating element mounted between each said pen and said carriage for moving the respective printing elements in a direction transverse to the swath axis.

23. (Original) The printer of Claim 13 wherein said fine positioning system includes a piezoelectric actuator for providing the incremental relative motion.

24. (Original) The printer of Claim 13 wherein the sensor system includes a first sensor mounted on a first side of the carriage and a second sensor mounted on a side of the carriage opposite the first side along the swath axis, the sensor system adapted for bidirectional sensing operation.

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25. (Previously presented) A method for swath printing, comprising:
printing a first swath of an image on a print medium with an ink-jet printing structure;
advancing the print medium to position the medium for printing a second swath;
determining zones of the second swath which need high accuracy swath alignment;
begin printing the second swath;
during said printing of the second swath, for those zones which need high accuracy swath alignment, determine the alignment errors and store in memory appropriate error compensation values;
after completing the printing of said second swath, calculate the next media advance distance based on the stored compensation values; and
advancing the media for the next swath to be completed by a distance dependent on said next media advance distance.

26. (Canceled)

27. (Previously Presented) A method for high accuracy media positioning in a swath printer, comprising:
providing a print medium;
providing a computer-controlled printing element, the printing element mounted for movement along a swath axis to print a first swath on the print medium;
moving the printing element along the swath axis and printing at least a portion of a swath on the print medium, said swath having a leading edge and a trailing edge;
providing relative motion between the printing element and the print medium to position for a fresh swath;
sensing the position of the trailing edge of the just printed swath;
providing relative motion between the print medium and the printing element to accurately position for the fresh swath in dependence on the sensed position of the trailing edge of the just printed swath to compensate for position errors between a nominal position of the trailing edge and the sensed position of the trailing edge of the just printed swath; and

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moving the printing element along the swath axis to print at least a portion of the fresh swath;

wherein said step of sensing the position of the trailing edge and said step of providing relative motion between the print medium and the printing element is performed simultaneously with the step of moving the printing element along the swath axis to print at least a portion of the fresh swath.

Claim 28. (Canceled)

29. (Previously Presented) The method of Claim 27 wherein providing relative motion between the print medium and the printing element to accurately position for the fresh swath includes:

moving the printing element in a direction transverse to the swath axis.

30. (Original) The method of Claim 29 wherein said moving the printing element in a direction transverse to the swath axis includes:

positioning a piezoelectric element between the printing element and the carriage; and

driving the piezoelectric element to move the printing element to obtain the accurate positioning.

31. (Previously presented) A method for high accuracy media positioning in a swath printer, comprising:

mounting a computer-controlled printing element for movement along a swath axis for swath printing of an image on a print medium;

moving the printing element along the swath axis and printing at least a portion of a swath of the image on the print medium;

sensing the position of an edge of the just printed portion of said image which is nominally aligned with the scan axis;

providing relative motion between the print medium and the printing element on the fly as the portion of the image is being printed and the print element is moving in the scan axis to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the image.

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32. (Previously Presented) A printing method, comprising:

- receiving a print job from a print job source, said print job consisting of text or a graphic image, or both a text and a graphic image;
- mounting a computer-controlled printing element for movement along a swath axis for swath printing of the print job onto a print medium;
- moving the printing element along the swath axis and printing at least a portion of a swath of the print job on the print medium;
- activating a media advance mechanism to provide a nominal advance movement between the printing element and the print medium to position for a fresh swath;
- moving the printing element along the swath axis;
- sensing the position of an edge of a just printed portion of said print job swath which is nominally aligned with the scan axis, wherein said edge is a bottom edge of a previously printed swath in relation to a direction of print medium advance through the swath printer past the printing element;
- providing relative motion between the print medium and the printing element to accurately position the printing element in dependence on the sensed position of the edge of the just printed portion of the print job to align the top edge of the next swath to be printed in relation to the bottom edge of the previously printed swath.

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EVIDENCE APPENDIX

No evidence submitted pursuant to 37 CFR Sections 1.130, 1.131 or 1.132 is relied upon by appellant in this appeal.

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RELATED PROCEEDINGS APPENDIX

There are no related proceedings and thus no decisions rendered in any such proceeding.

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